NORTH CAROLINA DIVISION OF AIR QUALITY

Application Review Including Preliminary Determination

Issue Date: TBD

Region: Winston-Salem Regional Office
County: Alamance
NC Facility ID: 0100237
Inspector's Name: Maria Aloyo
Date of Last Inspection: 07/20/2018
Compliance Code: 3 / Compliance - inspection

Facility Data

Applicant (Facility's Name): Canfor Southern Pine - Graham Plant

Facility Address:
Canfor Southern Pine - Graham Plant
4408 Mt Hermon - Rock Creek Road
Graham, NC 27253

SIC: 2421 / Sawmills & Planing Mills General
NAICS: 321113 / Sawmills

Facility Classification: Before: Title V **After:** Title V
Fee Classification: Before: Title V **After:** Title V

Permit Applicability (this application only)

SIP: 02D: .0503, .0516, .0521, .0524, .0530, .1100, .1111
02Q: .0711
NSPS: Subpart Dc
NESHAP: Subpart DDDDD
PSD: VOC
PSD Avoidance: n/a
NC Toxics: 02D .1100, 02Q .0711
112(r): n/a
Other: Removed 112(j)

Contact Data

Facility Contact	Authorized Contact	Technical Contact
Kristie Hill HR Manager (336) 376-5803 4408 Mt. Hermon-Rock Creek Road Graham, NC 27253	Mark Blalock Plant Manager (336) 376-5801 4408 Mt. Hermon-Rock Creek Road Graham, NC 27253	Kristie Hill HR Manager (336) 376-5803 4408 Mt. Hermon-Rock Creek Road Graham, NC 27253

Application Data

Application Number: 0100237.19A
Date Received: 02/12/2019
Application Type: Modification
Application Schedule: PSD

Existing Permit Data
Existing Permit Number: 06740/T21
Existing Permit Issue Date: 01/18/2019
Existing Permit Expiration Date: 04/30/2023

Total Actual emissions in TONS/YEAR:

CY	SO2	NOX	VOC	CO	PM10	Total HAP	Largest HAP
2017	10.55	92.88	321.14	122.61	44.60	24.22	15.63 [Methanol (methyl alcohol)]
2016	8.59	75.57	307.88	96.98	39.41	22.98	14.98 [Methanol (methyl alcohol)]
2015	8.39	73.83	301.87	58.60	37.93	25.31	15.12 [Methanol (methyl alcohol)]
2014	7.53	66.29	294.81	52.63	34.12	24.62	14.77 [Methanol (methyl alcohol)]
2013	9.36	82.35	272.79	65.63	37.36	22.78	13.66 [Methanol (methyl alcohol)]

Review Engineer: Russell Braswell

Review Engineer's Signature: **Date:**

Comments / Recommendations:
Issue 06740/T22
Permit Issue Date: TBD
Permit Expiration Date: April 30, 2023 (no change)

Table of Contents

1. Purpose of Application:

Canfor Southern Pine – Graham Plant ("Canfor", "the facility") is a lumber mill located in Alamance County, North Carolina. The facility is currently classified as a major stationary source under the Prevention of Significant Deterioration ("PSD") permitting program. The facility currently operates under Title V Air Quality Permit 06740T21.

The facility currently operates three wood-fired boilers that provide steam to six lumber drying kilns. Canfor has proposed to install a new natural gas-fired boiler to supplement steam from the wood-fired boilers. Canfor claims that doing so would allow more operational flexibility and reduce down-time during boiler maintenance events. In addition to the boilers and kilns, the facility operates green and dried lumber handling processes.

Although the addition of the new boiler would not modify any other operation at the facility, the increased capacity for steam generation would allow for increased annual throughput for the kilns and all associated wood and lumber handling processes. This "de-bottlenecking" of the facility would therefore increase emissions beyond the combustion of natural gas in the boiler. This results in an increase in emissions of Volatile Organic Compounds ("VOC") greater than the PSD significance threshold and therefore triggers PSD permitting requirements. The kilns and all associated wood and lumber handling processes are not subject to any Best Available Control Technology ("BACT") limits.

EPA regulations do not require any non-modified emissions unit to undergo BACT. See §51.166(j)(3) and §52.21(j)(3):

> *"A major modification shall apply best available control technology for each regulated NSR pollutant for which it would result in a significant net emissions increase at the source. This requirement applies to each proposed emissions unit at which a net emissions increase in the pollutant would occur as a result of a physical change or change in the method of operation in the unit."*

According to these regulations, BACT applies to those emissions units at which a significant net emissions increase would occur for any regulated NSR pollutant at the source, as a result of physical change or change in method of operation in the emissions unit. The EPA has interpreted these provisions to mean that BACT applies in the context of modification to only an emissions unit that has been modified or added to an existing facility.

For the purposes of determining whether a PSD permit is required (applicability of PSD), the EPA requires a permitting agency to look beyond the emissions unit being modified (across the entire source) to determine the extent of emissions increase that result from the modification. Thus, EPA has considered downstream and upstream emissions increases and decreases from emissions units that are not physically or operationally changed when determining the level of increases from the modification. These upstream or downstream emissions increases that are accounted for in the analysis are often the result of the increased throughput resulting from the removal of a bottleneck in the equipment that is physically changed. Debottlenecked emissions units are not subject to BACT as they have not experienced emissions increase due to physical change or change in method of operation of the unit itself.

2. Application Chronology:

a. May 1, 2018 — Pre-application meeting between Canfor and DAQ. At the time of this meeting, Canfor was planning to avoid PSD requirements as allowed by 15A NCAC 02Q .0317.

b. February 12, 2019 Application received in Raleigh Central Office.

c. February 19, 2019 Conference call between Canfor and DAQ regarding general overview of the application.

d. February 26, 2019 Acknowledgement letters sent to Canfor, US EPA, and US FLM.

e. March 11, 2019 Phone call to Josh Ralph [1] regarding the new boiler and previous air dispersion modeling.

f. March 12, 2019 Josh Ralph responded via email to the March 11 request for additional information.

g. March 1, 2019 Phone call to Kathy Ferry[2] regarding the potential increase in woodwaste burning at the facility and the date of previous chlorine air dispersion modeling.

h. March 29, 2019 Email to Kathy Ferry and Josh Ralph asking for clarification on calculations and boiler statistics in the application.

i. April 1, 2019 Memo issued by Matthew Porter [3] approving the application's impact analysis. The memo also agreed with the application's claim that no new modeling was required to demonstrate compliance with NC DAQ's toxic air pollutant ("TAP") rules.

j. April 3, 2019 Kathy Ferry responded via email to the March 29 request for additional information.

k. May 13, 2019 An initial draft of the Title V permit and associated permit review document were sent to DAQ staff (Tom Anderson, Samir Parekh, Lisa Edwards, Davis Murphy).

l. May 30, 2019 Initial draft to applicant (Kathy Ferry, Josh Ralph). Comments from the applicant were resolved by email on June 26, 2019.

m. XXXXX The Public Notice and EPA Review periods began as required by 15A NCAC 02Q .0501(b)(1), 02Q .0521(a), and 02Q .0522.

n. XXXXX Permit issued.

3. Existing Operations:

Canfor is a lumber mill that primarily produces kiln-dried dimensional lumber from southern pine logs. The facility also produces and sells wood chips and shavings.

The facility initially receives whole pine logs. The logs are sent to the saw mill where they are debarked and sawed into green rough-cut lumber. The green lumber is sent to the kilns where it is dried, and then sent to the planer mill where it is processed to final dimensions. Woodwaste generated during debarking and rough sawing are gathered and stored in wood residue silos. This woodwaste can either be burned in

[1] Consultant representing Canfor.
[2] Consultant representing Canfor.
[3] Meteorologist for NC DAQ.

one of the three wood-fired boilers or sent to a wood chipper to produce saleable wood chips. Woodwaste generated during planing is gathered and sold as wood shavings.

4. Compliance Status:

A review of the compliance history for this facility shows no violations within the previous five years before this application was received. During the most recent inspection[4] by DAQ of this facility, Canfor appeared to be in compliance with the Title V permit. Canfor included a signed Form E5 (aka Title V Compliance Certification) claiming that the facility is in compliance with all applicable requirements.

5. Proposed Equipment:

Canfor proposes to add one new natural gas-fired boiler (ID No. B-5). According to the Form B included in the application, the new boiler will be a Series 500 manufactured by Hurst. The boiler will be described in the permit as follows:

Emission Source ID No.	Emission Source Description	Control Device ID No.	Control Device Description
B-5 **PSD;** **NSPS, Dc;** **MACT, DDDDD**	One natural gas-fired boiler equipped with low NOx burners and an O_2 trim system (25.2 million Btu per hour maximum heat input capacity)	NA	NA

Steam from this new boiler will be directed to the six existing wood kilns as needed. The kilns will not be modified as part of this application.

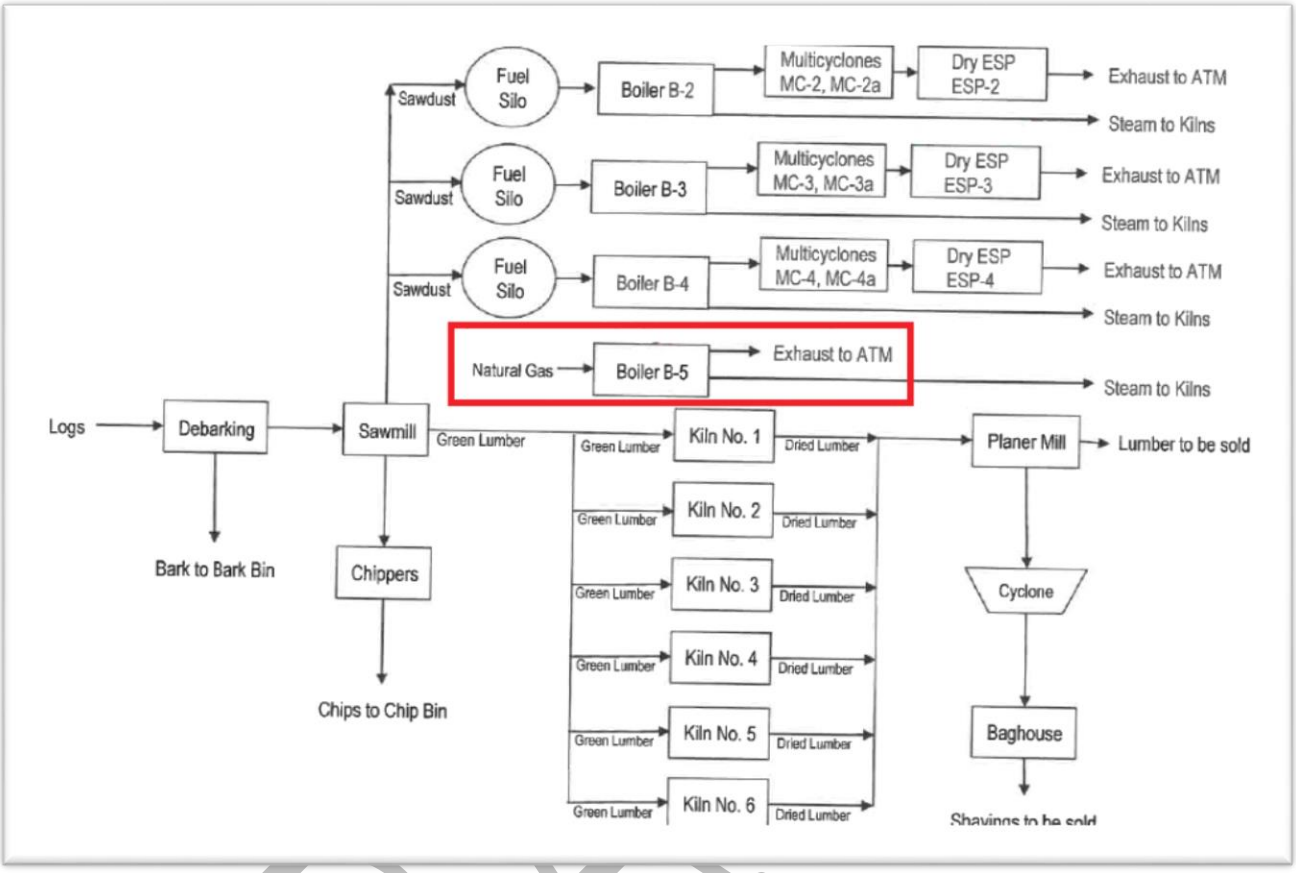
Per the BACT analysis (see Section 8 below), there will be no add-on control devices associated with this new boiler. Emissions from this boiler will be directed to the atmosphere through a dedicated stack. Figure 5-1 shows the new boiler in relation to the existing operations at the facility.

The purpose of this new boiler will be to provide steam to the kilns during maintenance and other periods of downtime for the existing boilers. This will allow more overall utilization of the kilns, and consequently increase overall lumber throughput at the facility. Due to the increase in throughput, the facility will also increase the amount of woodwaste generated, which could increase the availability of fuel for the wood-fired boilers. However, Canfor claims[5] that the facility already generates more woodwaste than the boilers can utilize. Therefore, an increase in woodwaste generation will not lead to an increase in utilization of the wood-fired boilers.

[4] At the time this determination was published, the facility was most recently inspected by Maria Aloyo of NC DAQ on July 20, 2018.

[5] Phone call with Kathy Ferry, item g. in Section 2.

Figure 5-1: Facility process flow diagram[6]



6. Regulatory Summary:

In addition to the General Conditions, the new boiler will be subject to the following State and Federal regulations:

- 15A NCAC 02D .0503 "Particulates from Fuel Burning Indirect Heat Exchangers"
- 15A NCAC 02D .0516 "Sulfur Dioxide from Combustion Sources"
- 15A NCAC 02D .0521 "Control of Visible Emissions"
- 15A NCAC 02D .0524 "New Source Performance Standards" (40 CFR Part 60, Subpart Dc)
- 15A NCAC 02D .0530 "Prevention of Significant Deterioration"
- 15A NCAC 02D .1100 "Control of Toxic Air Pollutants" *State-enforceable only*
- 15A NCAC 02D .1111 "Maximum Achievable Control Technology" (40 CFR Part 63, Subpart DDDDD)
- 15A NCAC 02Q .0711 "Emission Rates Requiring a Permit" *State-enforceable only*

Each of these rules and Canfor's ability to comply therewith are discussed below. Note that this facility is considered a Major Source for hazardous air pollutants. Therefore, regulations that apply specifically to Area Sources (e.g. 40 CFR Part 63, Subpart JJJJJJ) do not apply to this facility by default.

[6] Included in the application as Figure 2-3. Diagram originally drawn by Environmental Consulting & Technology of North Carolina, PLLC, the consulting firm that prepared this application for Canfor.

a. 15A NCAC 02D .0503 "Particulates from Fuel Burning Indirect Heat Exchangers"

This rule limits particulate emissions from heat exchangers (e.g. boilers) that burn non-wood fuels. The limit is calculated using the following equation:

$$E = 1.090 \times Q^{-0.2594}$$

Where *E* is the emission limit in pounds per million Btu burned and *Q* is the facility-wide heat input rate for fuel burned in heat exchangers. According to 02D .0503(d), wood is specifically excluded as a fuel as part of this rule. Therefore, *Q* is 25.2 and *E* is 0.47 pounds per million Btu.

According to emission factors published by US EPA, total PM emitted from the combustion of natural gas can be estimated as 7.6 pounds per million standard cubic feet of natural gas burned.[7] Using the standard conversion rate of 1,020 Btu per standard cubic feet of natural gas, the PM emission rate for natural gas burned in a boiler can be estimated as 0.007 pounds per million Btu. This assumes that the boiler is properly operated and maintained. Because permit conditions for both MACT Subpart DDDDD (see Section 6.g) and PSD (see Sections 6.e and 8) require good operation, maintenance, and recordkeeping, the permit condition for 02D .0503 will not contain any additional requirements.

b. 15A NCAC 02D .0516 "Sulfur Dioxide from Combustion Sources"

This rule limits emissions of sulfur dioxide ("SO_2") from sources that burn fuel. The rule limits SO_2 to less than 2.3 pounds per million Btu of heat input.

According to emission factors published by US EPA, SO_2 emitted from the combustion of natural gas can be estimated as 0.6 pounds per million standard cubic feet of natural gas burned.[8] Using the same conversion discussed in Section 6.a, the SO_2 emission rate for natural gas burned in a boiler can be estimated as 5.5 E-4 pounds per million Btu.

SO_2 formation from natural gas combustion is solely a product of the sulfur content of gas supplied to the source. Pipeline quality natural gas is never expected to contain enough sulfur to cause compliance issues with the emission limit above. The permit condition for 02D .0516 will not contain any additional requirements.

c. 15A NCAC 02D .0521 "Control of Visible Emissions"

This rule limits visible emissions ("VE") from non-fugitive emission sources to less than 20% opacity when averaged over a six-minute period.

Small, well-maintained natural gas-fired boilers do not produce substantial VE under normal circumstances. Because permit conditions for both MACT Subpart DDDDD (see Section 6.g) and PSD (see Sections 6.e and 8) require good operation, maintenance, and recordkeeping, the permit condition for 02D .0521 will not contain any additional requirements.

[7] AP-42 Table 1.4-2, published July 1998.
[8] See note 7.

d. 15A NCAC 02D .0524 "New Source Performance Standards"
(40 CFR Part 60, Subpart Dc "Small Industrial-Commercial-Institutional Steam Generating Units")

The Federal New Source Performance Standards ("NSPS") are incorporated into North Carolina's State Implementation Plan ("SIP") under 15A NCAC 02D .0524. The only specific NSPS that applies to the new boiler is Subpart Dc "Small Industrial-Commercial-Institutional Steam Generating Units".

Subpart Dc applies to new boilers with a heat input greater than 10 million Btu per hour. The rule has different requirements for boilers depending on the size and fuel type of the specific boiler. For the new boiler at Canfor, the rule only requires that the facility keep records of fuel use on a monthly basis. Canfor must also submit an Initial Notification after constructing the new boiler.

e. 15A NCAC 02D .0530 "Prevention of Significant Deterioration"

This section will discuss Canfor's compliance with the new specific condition for PSD included in the permit. See Section 8 for the BACT determination and discussion of other applicable PSD requirements.

Based on the determination in Section 8, the BACT limit for the new boiler will be 0.0054 lb/MMBtu, and the control technology will be good combustion practices with no additional add-on control devices. The application included a proposed maintenance plan to constitute "good combustion practices", and this plan will be included in the permit. No additional limits or requirements will be included in the permit.

f. 15A NCAC 02D .1100 "Control of Toxic Air Pollutants" (State-enforceable only)

This rule requires that facilities not emit toxic air pollutants ("TAPs") such that they contribute to an exceedance of an acceptable ambient limit ("AAL") listed in 02D .1104. In general, facilities that emit TAPs at rates greater than those listed in 15A NCAC 02Q .0711 (see Section 6.h, below) from non-exempt sources must perform air dispersion modeling to demonstrate compliance with the AALs.

1. Previous Air Dispersion Modeling

This facility has previously performed facility-wide air dispersion modeling in order to demonstrate compliance with the AALs.[9] This facility was required to perform modeling due to a call by the Director of NC DAQ[10] in 2009, as allowed by 15A NCAC 02Q .0712.

The modeled emission rates were based on the maximum potential emission rates from each boiler (at the time, there were four wood-fired boilers) and each of the six kilns. The modeled emission rates were then included in the permit as emission limits. Because the emission limits were equal to the maximum potential emission rates, no further monitoring, recordkeeping, or reporting was deemed necessary to comply with 15A NCAC 02D .1100.

2. Current Facility and Proposed Modifications

In the time after the 2009 modeling was performed, Canfor has removed one of the wood-fired boilers (ID No. B-1).

The proposed modification would add a new boiler and increase the utilization of the kilns. However, emissions of TAPs from the former boiler were greater than the increase in emissions

[9] Modeling approved by NC DAQ by memo on November 17, 2009.
[10] See letter from NC DAQ to this facility, dated April 27, 2009.

due to this application.[11] Therefore, NC DAQ has determined that no additional modeling is required for this application to demonstrate compliance with TAP emission rates.

3. Applicability

15A NCAC 02D .1102(b) states that facilities and sources must comply with the procedures in 02D .1100, except as provided by 02Q .0700. 15A NCAC 02Q .0702(a)(27)(B) allows any emission source subject to a rule under 40 CFR Part 63 (i.e. MACT) to be exempt from TAP emission requirements. NCGS 143-215.107(a)(5)b requires that NC DAQ demonstrate that any such exemption does not present an unacceptable risk to human health.

The proposed boiler is subject to 40 CFR Part 63, Subpart DDDDD (see Section 6.g), and therefore is potentially not subject to rules that regulate TAPs.

The previous facility-wide air dispersion modeling mentioned above demonstrated compliance with all AALs at that time. As discussed above, post-modification emissions of TAPs from this facility will be less than the originally modeled emission rates. Therefore, the facility is not expected to contribute to an exceedance of an AAL, and therefore NC DAQ does not believe exempting the new boiler from rules that regulate TAPs will present an unacceptable risk to human health.

Although sources at the existing sources at this facility could potentially be exempt from TAP emission requirements per 15A NCAC 02Q .0702(a)(27)(B), 15A NCAC 02Q .0702(b) and .0712 disallow an automatic exemption for sources based on the Director's call.

4. Conclusion

For the reasons discussed above, the addition of the new boiler will not trigger any new requirements under 15A NCAC 02D .1100. The specific condition for 15A NCAC 02D .1100 in the Title V permit will not include a reference to the new boiler.

Unrelated to the addition of the new boiler, the emission limits included in the permit under 02D .1100 have been corrected. See Section 9.c for details.

g. 15A NCAC 02D .1111 "Maximum Achievable Control Technology"
(40 CFR Part 63, Subpart DDDDD "Industrial, Commercial, and Institutional Boilers and Process Heaters")

The Federal rules included in 40 CFR Part 63 (often referred to as "Maximum Achievable Control Technology" or "MACT") are incorporated into North Carolina's SIP under 15A NCAC 02D .1111. The only specific MACT that applies to the new boiler is Subpart DDDDD "Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters".

Subpart DDDDD applies to all boilers located at major sources of hazardous air pollutants (HAP) as defined by §63.2. Canfor is one such source, so all boilers at this facility are subject to the rule. The requirements of this rule are based on several subcategories. For the purposes of this rule, the new boiler will be "new" and "designed to fire gas 1 fuels". In addition, the boiler will be equipped with an automated O_2 trim system. For such boilers, the rule does not include any specific emission limits. The only work practice requirement under the rule is to conduct a tune-up once every five years (see §63.7540(a)(12)).

[11] See NC DAQ modeling memo issued April 1, 2019 (item i. in Section 2).

The permit condition for MACT Subpart DDDDD will contain all applicable recordkeeping and reporting requirements in the rule.

h. 15A NCAC 02Q .0711 "Emission Rates Requiring a Permit" (State-enforceable only)

This rule requires a facility to demonstrate compliance with the TAP AALs listed in 02D .1104 if a modification would cause one of the pollutants listed in 02Q .0711 to be emitted above the listed threshold. The rule considers emissions from all sources except those exempted by 02Q .0702. As discussed in Section 6.f, the addition of the new boiler will not trigger any requirements for TAP emissions. The specific condition for 15A NCAC 02Q .0711 in the Title V permit will not be changed.

7. Emissions:

The processes at this facility can be divided into four categories: green woodworking, kiln drying, planing, and fuel combustion. The proposed boiler B-5 will increase overall throughput at the facility for each source (except the emergency generator), and thus increase emissions from each of these categories.

a. Green woodworking

Whole sawn logs are received at the facility and are debarked (ID No. Debarker). Debarked logs are cut into lumber within the sawmill (ID No. I-Sawmill) and green woodwaste is either chipped (ID No. I-Chippers) or stored in silos (ID No. I-Silos) and sent to the boilers.

Canfor estimates that the green woodworking produces 0.02 pounds of particulate matter (PM) and 0.011 pounds of PM10 per ton of logs processed, based on engineering estimate. Canfor has consistently used these factors when calculating emissions for the annual Emission Inventory, and DAQ has consistently accepted them. There are no other emissions expected from green woodworking operations. According to the application, the existing facility has the capacity to process 800,000 tons of logs. Canfor estimates that the addition of boiler B-5 will allow for increased utilization of the green woodworking processes. According to the application, the total increase is expected to be 195,477 tons of logs per year. Therefore, the projected increase in potential emissions ("potential to emit", "PTE") from the green woodworking processes due to the addition of the boiler can be estimated:

Figure 7-1: Project Increase in PTE from Green Woodworking Processes

$$\left(0.02\frac{\text{lb}_{\text{PM}}}{\text{ton}_{\text{logs}}}\right)\left(195{,}477\frac{\text{ton}_{\text{logs}}}{\text{yr}}\right)\left(\frac{1}{2{,}000}\frac{\text{ton}}{\text{lb}}\right) = 1.95\frac{\text{ton}_{\text{PM}}}{\text{yr}}$$

$$\left(0.011\frac{\text{lb}_{\text{PM10}}}{\text{ton}_{\text{logs}}}\right)\left(195{,}477\frac{\text{ton}_{\text{logs}}}{\text{yr}}\right)\left(\frac{1}{2{,}000}\frac{\text{ton}}{\text{lb}}\right) = 1.08\frac{\text{ton}_{\text{PM10}}}{\text{yr}}$$

b. Kiln drying

Green lumber is taken from the saw mill and placed in the kilns (ID Nos. K-1 through K-6) in order to reduce the moisture content of the green lumber. Heat for the kilns is provided by steam from separate boilers. Emissions from the drying process only come from material evaporating out of the green wood. Therefore, the only NSR pollutants expected from steam-heated kiln drying are VOC and PM. The kilns will also emit several HAPs, but HAPs are not considered NSR pollutants.

Canfor estimates emissions from kiln drying using NC DAQ's publicly available spreadsheet for calculating emissions from kilns.[12] The emission factors included in this spreadsheet are based on the type of wood being dried and type of kiln in which it is fired. For this specific facility, all wood being dried in the kilns are softwood, and all wood is dried using steam heat.

According to application, the existing facility has the capacity to dry 200,000,000 board-feet per year. Canfor later clarified[13] that the kilns have a total theoretical capacity of 200,000,000 board-feet per year, but the existing boilers cannot provide enough steam to achieve that production rate. Canfor believes that the addition of the new boiler will allow the kilns to achieve the maximum production rate.

Based on a comparison of production rates for the existing facility and the theoretical maximum production rate, Canfor estimates that the addition of boiler B-5 will allow for an additional 48,869,000 board-feet per year. Therefore, the projected increase in emissions from the kilns due to the addition of the boiler can be estimated:

Figure 7-2: Project Increase in PTE from Kilns

$$\left(0.022\frac{\text{lb}_{\text{PM}}}{10^3\text{bd-ft}}\right)\left(48{,}869\frac{10^3\text{bd-ft}}{\text{yr}}\right)\left(\frac{1}{2{,}000}\frac{\text{ton}}{\text{lb}}\right)=0.53\frac{\text{ton}_{\text{PM}}}{\text{yr}}$$

$$\left(4.09\frac{\text{lb}_{\text{VOC}}}{10^3\text{bd-ft}}\right)\left(48{,}869\frac{10^3\text{bd-ft}}{\text{yr}}\right)\left(\frac{1}{2{,}000}\frac{\text{ton}}{\text{lb}}\right)=99.94\frac{\text{ton}_{\text{VOC}}}{\text{yr}}$$

c. Planing

Dried lumber is removed from the kilns and taken to the planer mill (ID No. PM-2) for finishing to final dimensions. Emissions from the planer mill are all PM. Emissions from the planer mill are controlled by a cyclone and bagfilter in series (ID Nos. C-2 and BH-1).

Canfor estimated emissions from the planer mill using NC DAQ's publicly available spreadsheet for calculating emissions from woodworking activities.[14] For the purposes of these emission calculations, all wood processed in the planer mill is dry, and the only activity in the planer mill is planing.

According to the application, the planer mill has a theoretical capacity of 403,000,000 board-feet per year. However, the planer mill only handles wood processed by the kilns, so the planer mill is effectively limited to the kilns' throughput: 200,000,000 board-feet per year. Canfor estimates that the addition of boiler B-5 will allow for an additional 48,869,000 board-feet per year, which is 24.4% of the current capacity.

While operating at the current capacity, the planer mill produces 46,000 tons of woodwaste. The overall control efficiency of the bagfilter and cyclone is expected to be 99.9%. Therefore, the projected increase in emissions from the planer mill due to the addition of the boiler can be estimated:

[12] "Wood Kiln Emissions Calculator Revision C July 2007", available at https://deq.nc.gov/about/divisions/air-quality/. The emission factors in this spreadsheet are taken from National Council for Air and Stream Improvement, Inc. ("NCASI") Technical Bulletin 845.

[13] Email from Kathy Ferry (see item j. in Section 2).

[14] "Woodworking Emissions Calculator Revision C July 2007", available at https://deq.nc.gov/about/divisions/air-quality/. The emission factors in this spreadsheet are taken from NC DAQ memos dated April 26, 1995 and April 18, 1996.

Figure 7-3: Project Increase in PTE from Planing

$$\left(2.6\frac{\text{ton}_{\text{PM}}}{10^2\text{ton}_{\text{WW}}}\right)\left(46{,}000\frac{\text{ton}_{\text{WW}}}{\text{yr}}\right)(24.4\%\text{ increase})(1-99.9\%\text{ control efficiency})=0.29\frac{\text{ton}_{\text{PM}}}{\text{yr}}$$

d. Fuel combustion

The facility currently operates three wood-fired boilers (ID Nos. B-2, B-3, and B-4) and one emergency-use generator (ID No. IGen1). The boilers provide heat for the wood kilns and the generator is operated during emergency power outages. According to the application, these sources will not be affected by the addition of the proposed boiler B-5, and their utilization will not increase. Therefore, the only increase in emissions from fuel combustion sources at this facility will come from the new natural gas-fired boiler.

Combustion of natural gas produces the following NSR pollutants: PM, PM10, NOx, SO_2, CO, VOC, CO_2e, and lead. For each of these pollutants, Canfor estimated emissions using NC DAQ's publicly available spreadsheet for calculating emissions from natural gas combustion.[15] For the purposes of calculating emissions, the new boiler is equipped with Low-NOx burners and will operate year-round at maximum capacity. Therefore, the projected increase in emissions due to the addition of the boiler can be estimated:

Figure 7-4: Example Combustion Calculation[16]

$$\left(5.5\frac{\text{lb}_{\text{VOC}}}{10^6\text{scf}}\right)\left(\frac{1}{1{,}020}\frac{\text{scf}}{\text{Btu}}\right)\left(25.2\frac{\text{MMBtu}}{\text{hr}}\right)\left(8{,}760\frac{\text{hr}}{\text{yr}}\right)\left(\frac{1}{2{,}000}\frac{\text{ton}}{\text{lb}}\right)=0.60\frac{\text{ton}_{\text{VOC}}}{\text{yr}}$$

[15] "Natural Gas Combustion Emissions Calculator Revision N" available at https://deq.nc.gov/about/divisions/air-quality/. The emission factors in this spreadsheet are taken from AP-42 Table 1.4-2, published July 1998. PM emission factors taken from the 2014 National Emissions Inventory, available at https://www.epa.gov/air-emissions-inventories/2014-national-emissions-inventory-nei-data.

[16] "10^6 scf" means "million standard cubic feet" and "MMBtu" means "million British Thermal Units". These units are used throughout AP-42 Chapter 1, Section 4.

Figure 7-5: Project Increase in PTE from Fuel Combustion

Pollutant	Emission Factor ($lb/10^6 scf$)	Potential Emissions (ton/yr)
PM	0.52	0.06
PM10	0.52	0.06
PM2.5	0.43	0.05
SO_2	0.6	0.06
VOC	5.5	0.60
NOx	50	5.41
CO	84	9.09
CO_2e	120,248	13,012.27
Lead	5.00E-04	5.41E-05

Constants and Factors		
Boiler capacity	25.2	10^6Btu/hr
Natural gas heat content	1,020	Btu/scf
Units	2,000	lb/ton
	8,760	hr/yr

e. PSD Increment Tracking

Canfor is located in Alamance County, which has triggered PSD Increment Tracking for PM10 and SO_2. Any change in hourly emissions of those pollutants should be tracked.

Based on the above calculations, PM10 emissions from the facility will increase by 1.14 tons per year, and SO_2 emissions will increase by 0.06 tons per year. Therefore, the hourly emission rate increase for those pollutants will be 0.26 pounds per hour for PM10 (woodworking and fuel combustion) and 0.01 pounds per hour for SO_2.

8. New Source Review (NSR) and Prevention of Significant Deterioration (PSD):

All "major stationary sources" of air pollutants regulated under the Clean Air Act (Act) that perform a major modification must undergo a preconstruction review consistent with Section 165 of the Act prior to beginning actual construction. According to 40 CFR 51.166(b)(12), "major modification" means any physical change in or change in the method of operation of a major stationary source that would result in both a significant emission increase of a regulated NSR pollutant and a significant net emissions increase of that pollutant from the major stationary source.

A "major stationary source" is defined as a facility that is not one of the 28 named source categories listed in §51.166(b)(1)(iii) that has the potential to emit at least 250 tons per year (tpy) of one or more NSR/PSD regulated pollutant. Canfor falls under this definition because it is not one of the 28 named categories and it has annual VOC emissions greater than 250 tpy.

As an existing major source, Canfor must implement best achievable control technology ("BACT") and assess the environment impacts for each pollutant associated with the proposed new boiler with a significant emissions increase.

a. Determination of a Significant Emission Increase:

Any net emission increase (as defined by 40 CFR 51.166(b)(3)) is significant if it exceeds the significant emission rate (SER) listed in §51.166(b)(23). The definition of "net emission increase" includes changes due to the proposed modification and also any changes in emissions during the five years before the modification takes place (i.e. "contemporaneous").

The only contemporaneous change in emissions will occur when Canfor completes the installation of two electrostatic precipitators associated with boilers B-2 and B-3.[17] This change will only decrease particulate emissions and have no effect on emissions of any other NSR pollutant. Canfor chose not to take credit for any contemporaneous emission reductions with this application. Therefore, the net emission increase for this proposed modification is the sum of the emission increases related to the modification, calculated in Section 7, above. Figure 8-1 sums the emission increases and compares them to the thresholds listed in §52.21(b)(23).

Figure 8-1: Determination of Significant Emission Increases

Process	PM	PM10	PM2.5	SO_2	VOC	NOx	CO	Lead	CO_2e
	(ton/yr)								
Green Woodworking*	1.95	1.08	-	-	-	-	-	-	-
Kiln Drying*	0.53	-	-	-	99.94	-	-	-	-
Planing*	0.29	-	-	-	-	-	-	-	-
Fuel Combustion**	0.06	0.06	0.05	0.06	0.60	5.41	9.09	0.00005	13,0212.27
Total	2.83	1.14	0.05	0.06	100.54	5.41	9.09	0.00005	13,0212.27
SER (see §51.166(b)(23))	25	15	10	40	40	40	100	0.6	75,000
Significant?	No	No	No	No	**Yes**	No	No	No	No

* Debottlenecked source
** New source only, no change from existing fuel combustion sources.

The increase in potential emissions only exceeds the SER for VOC. Therefore, the project is subject to NSR/PSD review. As part of this review, Canfor must demonstrate the following:

- The BACT has been selected for the VOC emissions resulting from the proposed project;
- The VOC emissions from the project's construction and operation will not cause, or contribute to, air pollution more than any National Ambient Air Quality Standard ("NAAQS") in any air quality control region, or any other applicable emission standard or standard of performance; and
- The project's construction and operation will not cause, or contribute to, any other significant adverse impact.

b. Selection of BACT:

BACT is defined in 40 CFR 51.166 (b)(12) as follows:

> *An emissions limitation...based on the maximum degree of reduction for each pollutant... which would be emitted from any proposed major stationary source or major modification which the reviewing authority, on a case-by-case basis, taking into account energy,*

[17] See Application Review (a.k.a. "Statement of Basis") for Permit T21, issued January 18, 2019.

environment, and economic impacts and other costs, determines is achievable... for control of such a pollutant.

As evidenced by the statutory definition of BACT, this technology determination must include a consideration of numerous factors. The structural and procedural framework upon which a decision should be made is not prescribed by Congress under the Act. This void in procedure has been filled by several guidance documents issued by the federal EPA. The only final guidance available is the October 1980 "Prevention of Significant Deterioration – Workshop Manual." As the EPA states on page II-B-1, "A BACT determination is dependent on the specific nature of the factors for that particular case. The depth of a BACT analysis should be based on the quantity and type of pollutants emitted and the degree of expected air quality impacts." The EPA has issued additional DRAFT guidance suggesting the use of what they refer to as a "top-down" BACT determination method. While the EPA Environmental Appeals Board recognizes the top-down approach for delegated state agencies,[18] this procedure has never undergone rulemaking and as such, the top-down process is not binding on fully approved states, including North Carolina.[19] The Division prefers to follow closely the statutory language when making a BACT determination and therefore bases the determination on an evaluation of the statutory factors contained in the definition of BACT in the Clean Air Act.

As stated in the legislative history and in EPA's final October 1980 PSD Workshop Manual, each case is different, and the state must decide how to weigh each of the various BACT factors. North Carolina is concerned that the application of EPA's DRAFT suggested top-down process will result in decisions that are inconsistent with the Congressionally intent of PSD and BACT. The following are passages from the legislative history of the Clean Air Act and provide valuable insight for state agencies when making BACT decisions.

"The decision regarding the actual implementation of best available technology is a key one, and the committee places this responsibility with the State, to be determined on a case-by-case judgment. It is recognized that the phrase has broad flexibility in how it should and can be interpreted, depending on site.

In making this key decision on the technology to be used, the State is to take into account energy, environmental, and economic impacts and other costs of the application of best available control technology. The weight to be assigned to such factors is to be determined by the State. Such a flexible approach allows the adoption of improvements in technology to become widespread far more rapidly than would occur with a uniform Federal standard. The only Federal guidelines are the EPA new source performance and hazardous emissions standards, which represent a floor for the State's decision.

This directive enables the State to consider the size of the plant, the increment of air quality which will be absorbed by any particular major emitting facility and such other considerations as anticipated and desired economic growth for the area. This allows the States and local communities to judge how much of the defined increment of significant deterioration will be devoted to any major emitting facility. If, under the design which a major facility proposes, the percentage of increment would effectively prevent growth after the proposed major facility was completed, the State or local community could refuse to permit construction, or limit its size. This is strictly a State and local decision; this legislation provides the parameters for that decision.

[18] See http://es.epa.gov/oeca/enforcement/envappeal.html for various PSD appeals board decisions including standard for review.
[19] North Carolina has full authority to implement the PSD program, 40 CFR 52.1770.

One of the cornerstones of a policy to keep clean areas clean is to require that new sources use the best available technology available to clean up pollution. One objection which has been raised to requiring the use of the best available pollution control technology is that a technology demonstrated to be applicable in one area of the country in not applicable at a new facility in another area because of the differences in feedstock material, plant configuration, or other reasons. For this and other reasons the Committee voted to permit emission limits based on the best available technology on a case-by-case judgment at the State level. This flexibility should allow for such differences to be accommodated and still maximize the use of improved technology."

The new boiler is subject to a BACT review because the project net increase of VOC will exceed the SER. Note that other sources at the facility are not being modified by the addition of the boiler, and will therefore not be subject to the a BACT review.

1. Search of the U.S. EPA's RACT/BACT/LAER Clearinghouse (RBLC)

   As part of the BACT assessment, a review was performed of previous BACT determinations made during the past ten years related to VOC emissions from small natural gas-fired boilers (Process Code 13.310). According to the application, the RBLC was searched on January 23, 2019. Based on the results of this search, there are no cases in which an add-on device to control VOC emissions from a small natural gas-fired boiler was determined to be BACT. BACT emission limits have been consistently based on the AP-42 emission factor of 5.5 pounds per million standard cubic feet.[20] Based on the suggested conversion rate of 1,020 Btu per standard cubic feet of natural gas, the emission factor can be written as 0.0054 pounds per million Btu heat input. The most common BACT determinations were for good maintenance/work/combustion practices and the use of pipeline-quality natural gas.

2. Evaluation of VOC Control Technology Feasibility

   The most common methods of controlling VOC emissions are:

   - Condensation;
   - Thermal oxidation;
   - Catalytic oxidation;
   - Adsorption;
   - Biofiltration; and
   - Good combustion practices

   Each of these methods will be evaluated for technical feasibility for this specific application. Note that, for the exhaust of a natural gas-fired boiler, the exhaust will be approximately 400 °F, fast-moving, and has a low concentration of the targeted pollutant (estimated to be at most 10 ppm).

   A. Condensation

      According to EPA's technical bulletin regarding condensers and organic emissions,[21] a refrigerated condenser could be viable if the gas stream 1) is nearly saturated with organic compounds, 2) is moving at a relatively low flow rate, and 3) is at a low temperature relative to the condensation point of the organic compounds.

[20] See note 7.
[21] See EPA Publication EPA 456/R-01-004, pg. 2.

The boiler exhaust meets none of these requirements, and therefore condensation is considered technically infeasible.

B. Thermal Oxidization (a.k.a thermal incineration)

According to EPA's technical bulletin regarding thermal incinerators,[22] a typical design condition for a thermal incinerator is an *outlet* VOC concentration of 20 ppm. Given that this is greater than the boiler exhaust, thermal oxidation is technically infeasible.

In addition, the application notes that the boiler exhaust is below the operational range of a thermal oxidizer, which means that any such system would require supplemental fuel to operate. Combusting additional fuel would have the effect of counterintuitive effect of raising emissions from the boiler.

C. Catalytic Oxidization (a.k.a catalytic incineration)

According to EPA's technical bulletin regarding catalytic incinerators,[23] catalytic oxidation has been used effectively with inlet loadings as low as 1 ppm. The document provides no other evidence that would specifically rule out the use of such a device with boiler exhaust.

According to the EPA bulletin, annualized costs (expressed in 2002 dollars) of operating a catalytic oxidizer range from $8 - $50[24] per standard cubic foot per minute of exhaust (scfm), with units designed for low VOC concentration exhaust being much more expensive. The boiler exhaust is expected to be approximately 4,271 scfm, and therefore Canfor estimates an annualized cost of a catalytic oxidizer to be $170,840. Operating such a control device would reduce VOC emissions by 0.58 tons per year, resulting in a per-ton cost of $294,551.

In addition, the application notes that the boiler exhaust is below the operational range of a catalytic oxidizer, which means that any such system would require supplemental fuel to operate. Combusting additional fuel would have the effect of counterintuitive effect of raising emissions from the boiler.

Given the high cost of operation and the need for supplemental fuel, catalytic oxidation is not a feasible option.

D. Adsorption

According to EPA's technical bulletin regarding adsorption systems,[25] adsorption can be used for gas streams with VOC concentration as low as 20 ppm. Given that this is greater than the boiler exhaust, adsorption is technically infeasible.

E. Biofiltration

According to EPA's document regarding the use of bioreactors,[26] biofiltration is not viable when targeting compounds not soluble in water. According to AP-42, the primary VOC that results

[22] See EPA Publication EPA 452/F-03-022, pg. 1.
[23] See EPA Publication EPA 452/F-03-018, pg. 3.
[24] See note 23, pg. 4.
[25] See EPA Publication EPA 456/F-99-004, pg. 2.
[26] See EPA Publication EPA 456/R-03-003, pg. 3.

from the combustion of natural gas is butane,[27] which is not soluble in water. Therefore, biofiltration is technically infeasible.

F. Good Combustion Practices

In the application, Canfor proposed to use proper maintenance and operation (a.k.a. good work practices, good combustion practices) as BACT. Given that there are no other feasible options, as discussed above, DAQ agrees with this determination. Based on the search of the RBLC, discussed above, the BACT emission limit will be based on the AP-42 emission factor of 0.0054 pounds per million Btu. The BACT emission limit applies to all periods of boilers operations including start-up, shut-down, and malfunction.

In the application, Canfor proposed to use regularly scheduled maintenance tasks to ensure good combustion practices are maintained. The maintenance plan in the application breaks tasks into groups to be done daily, weekly, monthly, semi-annually, and annually. The application did not propose to use the five-year tune-up required by 40 CFR Part 63, Subpart DDDDD (see Section 6.g) as part of BACT. Note that AP-42 Section 1.4.3 states that "VOC emissions are minimized by combustion practices…", and Section 1.4.4 does not list any control options specifically for VOC.

NC DAQ agrees with the proposed BACT standard in the application. Given the negligible VOC emissions from the boiler, the Title V permit will not require a compliance demonstration.

c. Source Impact Analysis

40 CFR 51.166(k) requires that Canfor demonstrate the proposed emission increases associated with this modification will not 1) contribute to a violation of any NAAQS, or 2) contribute to an increase greater than the maximum allowable over the baseline concentration. In order to demonstrate compliance with §51.166(k), Canfor performed an ambient air quality analysis per §51.166(m).

Canfor's analysis was based on US EPA's guidance[28] for examining emission rates of ozone precursors. Because this the proposed project will only cause a significant emission increase for only VOC, and VOC is a precursor for ozone, Canfor only followed the guidance for ozone (O_3) analysis. The guidance states:

> *"NOx and VOC precursor contributions to 8-hour daily maximum O_3 are considered together to determine if the source's air quality impact would exceed the critical air quality threshold. In such a case, the proposed emissions increase can be expressed as a percent of the lowest MERP for each precursor and then summed. A value less than 100% indicates that the critical air quality threshold will not be exceeded when considering the combined impacts of these precursors on 8-hour daily maximum O_3."*[29]

Determining the projects O3 impact can be determined using the equation in Figure 8-2. In the application, Canfor selected the most conservative available MERP values for the eastern United States (170 tpy for NOx, 1,159 tpy for VOC) and compared them to the projected emission increases (shown in Figure 8-1).

[27] See note 7. Butane is the largest organic compound listed in Table 1.4-3 that is also classified as a VOC.
[28] See EPA Publication EPA 454/R-16-006.
[29] See note 28, pg. 30.

Figure 8-2: O_3 Impact Calculation

$$\frac{\text{Project Increase (NOx)}}{\text{NOx MERP}} + \frac{\text{Project Increase (VOC)}}{\text{VOC MERP}} = \%\text{impact}$$

$$\frac{5.41}{170} + \frac{100.53}{1{,}159} = 12\%$$

Because the calculated impact is less than the critical air quality threshold (i.e. 100%), this project is not expected to contribute to a violation of the 8-hour O_3 NAAQS and no additional modeling is necessary.

d. Additional Impact Analysis

§51.166(o) requires that additional impacts due to the modification must be analyzed. The rule specifically mentions the following: visibility, soils and vegetation, and general growth associated with the modification.

1. Visibility:

This modification results in a significant increase of only VOC emissions. VOC is generally considered not to have an impact on regional visibility, so no additional analysis is necessary.

2. Soils and Vegetation:

US EPA's guidance on determining impacts on soil and vegetation do not directly mention VOC emissions.[30] The document does mention O_3 as having a potential impact, but given that this modification's impact on ambient O_3 is not expected to be significant (see Section 8.c), little or no significant impacts are anticipated from the project to soils and/or vegetation.

3. General Growth Associated with the Modification:

According to the application, Canfor expects to hire up to 20 new employees to handle the increased production at the facility. However, the application also notes that 1) the facility is already well established and will not require additional infrastructure and 2) there is an existing pool of unemployed potential workers, so the project is not expected to increase residential growth in the area.

9. Other Regulatory Concerns:

a. Section 112(j) of the Clean Air Act:

The existing Title V permit contains references to North Carolina's Case-by-Case MACT (CBCM) for boilers and process heaters. This rule was developed as required under Section 112(j) of the Clean Air Act. The rule was required because of legal challenges surrounding 40 CFR Part 63, Subpart DDDDD (a.k.a. the boiler MACT), which caused the boiler MACT to be vacated and delayed several times. US EPA eventually re-promulgated the boiler MACT in 2012 which allowed the CBCM to expire. North Carolina set the expiration date of the CBCM as May 19, 2019. After this date, the facility will comply with the boiler MACT instead of the CBCM.

[30] See EPA Publication EPA-450/2-81-078, pg. 11.

Because this date is after the issue date of this permit, references to the CBCM have been removed from the Title V permit. Removing the CBCM from the permit does not change overall regulatory requirements for Canfor because the permit already includes the expiration date for the CBCM.

b. Insignificant Activities:

This facility operates a green sawmill, green wood chippers, and wood fuel storage silos. These activities are not expected to emit any pollutants. However, for clarity, they will be included on the list of Insignificant Activities attached to the Title V permit.

This change does not reflect any change in the facility's operations.

c. Corrections to Specific Condition 2.2 A.1 in the Title V Permit:

Condition 2.2 A.1 contains emission limits for several TAPs emitted from the boilers (excluding B-5) and kilns. The limits for these TAPs are based on previous air dispersion modeling.[31] When reviewing the initial draft of the permit, it was noticed that the TAP emission limits had been incorrectly written in the permit. DAQ has always intended for the initially modeled emission rates to be included in the permit as emission limits, so this change is only a correction.

10. Public Notice Requirements:

11. Conclusion:

TBD.

[31] See note 9.

Attachment 1 to Preliminary Determination of Application 0100237.19A
Canfor Southern Pine – Graham Plant

Table of Changes to Permit

Page*	Section*	Description of Changes
Throughout	Throughout	• Updated dates and permit numbers; • Fixed formatting
n/a	List of Insignificant Activities	• Added the following sources: I-Sawmill, I-Silos, I-Chipper. These sources have always been present at the facility, this is just for clarity
3	List of Emission Sources and Control Devices	• Added boiler B-5. • Removed references to Case-by-Case MACT.
4	2.1 A.	• Removed references to Case-by-Case MACT because it has expired.
11-16	2.1 D.	• Added this section. • Added conditions for the following rules: 02D .0503, .0516, .0521, .0524, .0530, .1111
17	2.2 A.1	• Corrected TAP emission limits for B-2, B-3, B-4 because they had been previously listed incorrectly in the permit.
20	2.2 C.	• Removed permit condition for 02D .1109 because the requirements have expired. • Renumbered remaining condition.

* This refers to the current permit unless otherwise stated.